ISSN (print) 0093-4666 © 2010. Mycotaxon, Ltd. ISSN (online) 2154-8889

MYCOTAXON

DOI: 10.5248/113.179

Volume 113, pp. 179–183 *July–September 2010*

Revised description of *Pseudocercospora cornicola*

Kassie N. Conner, Gareth Morgan-Jones & Kira L. Bowen

connekn@auburn.edu
Department of Plant Pathology, Auburn University
209 Life Sciences Building, Auburn University AL 36849 US

Abstract — *Pseudocercospora cornicola* (basionym *Cercospora cornicola*), the causal organism of cercospora leaf spot on flowering dogwood, was redescribed and illustrated from its type material and from fresh collections made in Alabama, where it is of common occurrence. Sequence data was obtained from four isolates to support the morphological data for species and generic concepts. The appropriateness of its generic classification is discussed and comments are made on previous descriptions and circumscription of the genera *Cercospora*, *Pseudocercospora*, and *Pseudocercosporella*.

Key words — *Cornus florida,* hyphomycete, sequence analysis, taxonomy

Introduction

The hyphomycetous anamorph *Cercospora cornicola* was first named and described in 1896, based on a collection made the previous year on languishing leaves of *Cornus florida* at Ocean Springs, Mississippi by S.M. Tracy & F.S. Earle. The fungus was described by Tracy & Earle (1896) as follows:

> "Epiphyllous, on irregular brown deadened spots without a definite border, 5–10 mm. Hyphae densely clustered from a nodular base, very short, continuous, somewhat flexuous, olivaceous, 11–15 by 3–4 μm; conidia slender, thread-like, somewhat curved, mostly continuous, hyaline or light olivaceous, 60–70 by 2–3 μm."

Type specimens were deposited in the herbaria of Cornell University (CUP), the U.S. Department of Agriculture (BPI), Rutgers College (RUT), Columbia University, and Harvard University (FH).

Chupp (1953) emended Tracy & Earle's description of *C. cornicola*, describing it thusly:

> "Leaf spots irregular brown areas without definite borders, 5–10 mm in extent; fruiting epiphyllous; stroma small, dark, globular, 20–40 μm in diameter; fascicles dense to very dense; conidiophores very pale

> olivaceous brown, delicate, wavy, uniform in width and color, septa not visible, not or rarely mildly geniculate, not branched, rounded tip, spore scars not visible, 2–3.5 × 10–25 µm; conidia narrowly obclavate, subhyaline to very pale olivaceous, mildly curved, obconic base, subacute tip, septa indistinct, 2–3 × 20–70 µm."

Hosts were listed as *Cornus florida*, *C. officinalis* Siebold & Zucc., *C. controversa* Hemsl., and *Cornus* spp. (Chupp 1953).

The original description of *Cercospora* by Fresenius allowed a broad concept of the genus to be adopted, as a result of which hundreds of species were classified within it. However, it has subsequently been broken down into smaller, more narrowly defined, segregate genera, including *Pseudocercospora* Speg. and *Pseudocercosporella* Deighton. Modern descriptions of these two genera can be found in Ellis (1971) and Braun (1995), respectively. *Cercospora cornicola* lacks the prominent, thickened conidiophore and conidial scars typical of *Cercospora* and hence was reclassified by Guo & Liu (1989) as *Pseudocercospora cornicola*, but it was not given a comprehensive, updated description.

Pseudocercospora and *Pseudocercosporella* are closely related genera that are part of a continuum (Braun 1995). The main difference between the two is that *Pseudocercosporella* consists of fungi with colorless conidiophores and conidia and well-developed, hyaline or subhyaline, rarely pigmented, stromata, whereas *Pseudocercospora* species have pigmented conidiophores and conidia (Braun 1995).

Pseudocercospora cornicola occurs commonly on living leaves of flowering dogwood (*C. florida*) in the southeastern United States. Records exist of its occurrence in Japan (Chupp 1953) and China (Guo & Liu 1989). Recent fresh collections obtained in Alabama and examination of the type material of *C. cornicola* has allowed the opportunity to provide a more thorough taxonomic description with illustration.

Taxonomic description

Pseudocercospora cornicola (Tracy & Earle) Y.L. Guo & X.J. Liu, Mycosystema 2: 232, 1989. FIG. 1

≡ *Cercospora cornicola* Tracy & Earle, Bulletin of the Torrey Botanical Club 23:205, 1896.

Leaf spots necrotic lesions, vein-limited, angular, irregularly shaped, up to 10 mm in diameter, and often confluent. Mycelium internal; composed of branched, septate, pale brown hyphae; and 2–3 µm in diameter. Caespituli epiphyllous, consisting of punctiform fascicles, olivaceous brown, discrete, usually abundant, and gregarious to somewhat scattered. Stroma well-developed; erumpent; partly superficial, partly immersed; pale to mid-brown; composed of densely packed, predominately isodiametric, subglobose to somewhat angular cells; pseudoparenchymatous; and up to 70 µm in diameter. Conidiophores

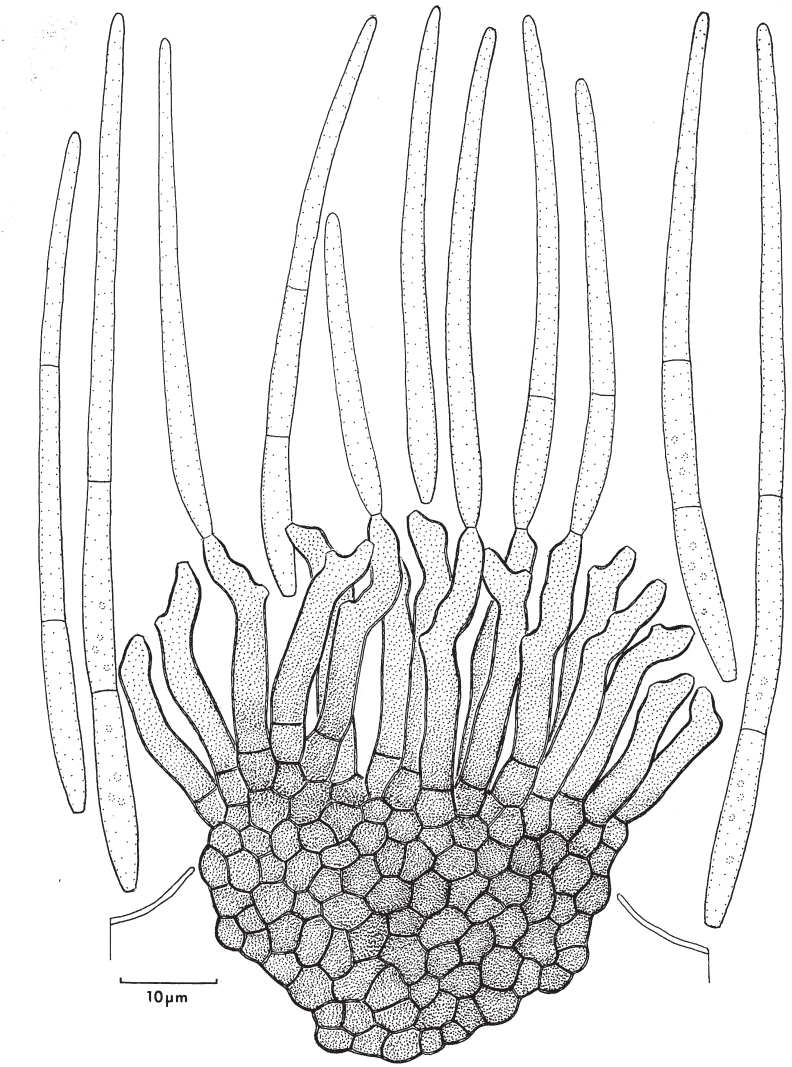

Figure 1. *Pseudocercospora cornicola* caespituli.

numerous in dense fascicles, pale olivaceous brown, smooth walled, cylindrical, straight, or slightly curved, becoming geniculate distally with age, usually one septum, 2–3 µm in width, up to 4 µm at the base, and up to 25 µm in length. Conidia narrowly obclavate, hyaline to very pale olivaceous-brown, straight to slightly curved, faintly septate, usually 1–2 septa, sometimes 3 septa, obtuse at apex, truncate at base, 2–3 µm in width, and 20–70 µm in length.

Cosmopolitan on living leaves of *C. florida* L.

Collections examined (all on *Cornus florida*): Alabama—Elmore County, Wetumpka: August 31, 2005, K. N. Conner, AUA; Lee County, Auburn: August 31, 2005, K. N. Conner, AUA. Mississippi—Ocean Springs: September 29, 1895 [CUP-039517, **isotype**].

Sequence analysis

Four isolates of *P. cornicola* (collected from Auburn, Lee County and Wetumpka, Elmore County, Alabama) were grown on Acidic Potato Dextrose Agar (APDA) at 30°C for 4 weeks. DNA was extracted with an UltraClean™ Microbial DNA Isolation Kit (MoBio Laboratories, Carlsbad, CA) following manufacturers recommendations. The DNA was amplified using universal fungal primers 2234C and 3126T, designed to amplify the 3' end of the 18S ribosomal RNA gene, internal transcribed spacer 1, 5.8S ribosomal RNA gene, internal transcribed spacer 2, and the 5' end of the 28S ribosomal RNA gene (Ranjard et al. 2001). The PCR products (approximately 500 bp) were sequenced and deposited in GenBank (accessions GU573789, GU573790, GU991657, and GU991658). The four sequences were compared to those present in GenBank using the nucleotide basic local alignment search tool (nBLAST) to support the morphological data and generic placement (Altschul et al. 1990).

Discussion

Although currently classified in *Pseudocercospora*, *P. cornicola* has some characteristics in common with taxa placed in *Pseudocercosporella*, particularly the presence of conidiophores bearing inconspicuous, unthickened, colorless conidial scars and filiform, thin-walled conidia whose base is also unthickened (Braun 1995). On account of this, *Pseudocercosporella* might be a more appropriate generic home for this species. However, the stromata and conidiophores are somewhat pigmented and therefore its placement in *Pseudocercospora* is probably warranted. This taxon is, essentially, an entity with features that are intermediate between the two genera. The ITS sequence data showed a 98% similarity between the four isolates and 97% or higher similarity with other *Pseudocercospora* sequences found in GenBank. Furthermore, the *P. cornicola* sequences showed 91% or lower similarity to *Cercospora* sequences and 83%

or lower similarity to *Pseudocercosporella* sequences found in GenBank, which supports the generic placement.

The revised description differs notably from previous accounts in that the stroma is well developed and up to 70 µm in diameter, the conidiophores become geniculate distally with age and usually contain one septum, and the conidia are faintly septate, usually containing 1–2 and sometimes 3 septa. With this new description there should be no confusion as to the identity of *P. cornicola* on flowering dogwoods.

Acknowledgments

We thank Kathie T. Hodge, Cornell University Plant Pathological Herbarium (CUP), for affording us the opportunity to examine the *P. cornicola* isotype. Dr. John M. McKemy, United States Department of Agriculture, and Dr. Richard Baird, Mississippi State University, provided presubmission reviews of the manuscript for which we are grateful.

Literature cited

Altschul SF, Gish W, Miller W, Myers EW, Lipman DJ. 1990. Basic local alignment search tool. Journal of Molecular Biology 215: 403–410.

Braun U. 1995. A monograph of *Cercosporella*, *Ramularia* and allied genera (Phytopathogenic hyphomycetes) Vol. 1. Eching bei Munchen: IHW-Verlag. 333 p.

Chupp C. 1953. A monograph of the fungus genus *Cercospora*. Ithaca, New York: Cornell University Press. 667 p.

Ellis MB. 1971. Dematiaceous hyphomycetes. Kew: Commonwealth Mycological Institute. 608 p.

Guo YL, Liu XJ. 1989. Studies on the genus *Pseudocercospora* in China I. Mycosystema 2: 225–240.

Ranjard L, Poly F, Lata J-C, Mougel C, Thioulouse J, Nazaret S. 2001. Characterization of bacterial and fungal soil communities by automated ribosomal intergenic spacer analysis fingerprints: biological and methodological variability. Applied and Environmental Microbiology 67: 4479–4487. doi:10.1128/AEM.67.10.4479-4487.2001

Tracy SM, Earle FS. 1896. New species of fungi from Mississippi. Bulletin of the Torrey Botanical Club 23: 205–211. doi:10.2307/2478175